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ABSTRACT

This collection of conference abstracts focuses on new directions for research on mental representation and early language development. One page summaries are provided on the following topics: Mental Representation and Initial Language Learning, by Lorraine M. Nicolich; Critical Issues in Language and Cognitive Development, by Roberta Corrigan; Relationships Between Early Language and Other Symbolic Skills in Young Down's Syndrome Children, by Patricia M. Hill; Communicative and Sensorimotor Development in Down's Syndrome Children, by Carol Greenwald and Laurence B. Leonard; Sensorimotor Development and Pre-Linguistic Communication, by K. F. Steckol and L. B. Leonard; Contextual Support: A Perspective on the Development of Language and Action, by Lorraine Rocissano; and a statement on measures of representation by Kurt W. Fischer. (SS)

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Souvenir of Conversation Hour

Mental Representation and Early Language Development: Directions for Exploring Relationships

Chair: Lorraine McCune Nicolich, Rutgers University

Participants: Elizabeth Bates, Roberta Corrigan, Anthony Costello, Greta Fein, Larry Fenson, Kurt Fischer, Jean Gowen, Patricia Hill, Laurence Leonard, Ernst Moerk, Lorraine Nicolich, Douglas Ramsay, Jane Raph, Lorraine Rocissano, Karen Steckol

Despite the swing in the early 1970's to a view that language should no longer be studied only as an autonomous skill, progress has been slow in either specifying language-cognition relationships or demonstrating the independence of the two systems. In the last several years empirical work has proceeded concerning the relationship of initial language to sensorimotor skills and symbolic play. Object permanence had previously been considered the most likely pre-requisite skill for language, but correlational results have not supported a strong relationship between these abilities. (Bates et al, 1977; Corrigan, 1976). Some evidence does exist for a specific relationship of onset of language with entry into stage 6 object permanence (Corrigan, 1978; Ramsay, 1978) and the use of such words as "more" and "allgone" with attainment of the highest object permanence ranks (Corrigan, 1978). The development of means-end skills has emerged as a sensorimotor ability that is correlated with language measures, reflecting the importance of communicative as well as cognitive skills for language development (Bates et al, 1977, Hill, 1978). First appearance of symbolic play has also been associated with onset of language (Bates et al, 1975). There is also evidence for language changes co-occurring with later developments in symbolic play. Changes in the rate of vocal imitation are reported by Nicolich and Raph (1978), which are consistent with changes in symbolic play. Prediction of language combination by symbolic play behavior are reported by Lowe and Costello (1976), Raph and Nicolich (1975) and Hill (personal communication).

Data concerning these issues remains sparse and should not form the basis for any conclusions regarding these relationships. Measurement techniques in both domains are rather insensitive. In the language domain it remains difficult to establish criteria for more advanced performances. While MLU has been criticized as too gross a measure to be meaningful, more detailed consideration involving semantic-syntactic categories requires inferences beyond the basic data which may not be justified (Howe, 1976). New approaches to studying representation and language are being devised by researchers who are often unaware of one another's progress. For example, a psychometric approach is being employed by Hill (1978) and Ramsay (personal communication) in attempting to devise physiological measures of representation.

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CONVERSATION HOUR: MENTAL REPRESENTATION AND EARLY LANGUAGE DEVELOPMENT: DIRECTIONS FOR EXPLORING RELATIONSHIPS

MENTAL REPRESENTATION AND INITIAL LANGUAGE LEARNING

Lorraine McCune Nicolich

I am currently beginning a research project which addresses a number of theoretical issues raised by others in their summaries. If there are antecedent cognitive abilities pre-requisite to language, comparison of linguistic and non-linguistic performances hypothesized to be structurally related is one approach to discovering them. The research addresses the hypothesis that language is only one manifestation of the ability to symbolize which evolves in the second year of life. The major objectives of the study are a) validation of sequential developments in symbolic play which have been proposed by Piaget and demonstrated (with modifications) in a small-sample longitudinal study (Nicolich, 1977); and b) comparison of symbolic development as shown in object permanence and play with language behavior occurring at the same time. Are these non-linguistic and linguistic performances based on the underlying cognitive ability to symbolize? The timing of transitions in a longitudinal sample and observed performances in a cross-sectional sample in these two domains will provide evidence regarding this question. Measures of general development (Bayley Scales), language comprehension and means-end behavior will allow assessment of the influence of these abilities on the major variables. If the proposed relationships do not apply, results will be useful in modifying the theoretical position tested.

Children between 8 and 24 months of age will be visited at home twice within a one week period for testing and videorecording of a free play session with the mother, using a standard set of toys. Language and play data will be derived from the videotapes by independent coders. The following variables are of primary interest: a) the level of representation achieved when certain language milestones such as the production of multiword utterances emerge for each child; b) the extent of vocal imitation and its consistency across subjects and representation levels; c) the influence of additional variables measured on these developments and d) sex differences with respect to these variables.

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CRITICAL ISSUES IN LANGUAGE AND COGNITIVE DEVELOPMENT

One major issue confronting researchers in the area of mental representation and early language is whether a central construct such as representation can account for a child's development across different symbol systems and tasks or whether development is specific to the symbol system or task in question. The assumption among many language and cognitive researchers, stemming from a Piagetian perspective, has been that representation is a central construct which underlies many different cognitive abilities including deferred imitation, object permanence, symbolic play, etc. However, a number of researchers (e.g., Bates et al, in press; Corrigan, in press; Fischer, in press) have recently concluded that evidence supports a view of independent development in separate cognitive domains, except where different behaviors share specific structures. This conclusion has numerous implications for research including (1) the need for more precise operational definitions of mental representation and (2) the abandonment of the notion that measurement on any cognitive task will be an indication of the child's cognitive stage on other tasks. In fact, the entire notion of cognitive stages needs to be redefined to accomodate available evidence on decalage.

A second, related Piagetian assumption is that variations in task factors and administration will not have a substantial impact. This assumption has resulted in the application of different criteria for the assignment of behaviors to stages, even within the same cognitive domain. These changing criteria have often led to differing results on the relationship between language and cognition (See Corrigan, in press for a review of studies on language and object permanence). In fact, variations in task factors and administration do have major impacts in many cognitive domains. For example, in research currently underway in my lab on search for objects undergoing successive invisible displacements, the displacement of the object in one direction before the other on alternating trials is a significantly more difficult task than the displacement of the object in one direction for a block of trials before its displacement in the other direction. It appears that there is also a practice effect in searching for an invisibly displaced object so that children who receive fewer trials are less likely to "achieve object permanence" than children who receive more trials.

Along with deciding which cognitive theory is appropriate for describing various representation skills, there is also a need to specify language abilities and tasks. In particular, a major research goal should be the development of theories of language acquisition that incorporate information about the child's cognitive abilities. One promising attempt in this area is the incorporation of prototype theory into a language acquisition model (Bates & MacWhinney, in press).

My own research, funded by the Spencer Foundation, begins from the assumption that different behaviors will not be related unless they share specific structures. The thrust of my research thus far has been to determine which, if any, skill components are shared by various cognitive domains such as language and symbolic play (Corrigan, in prep) or object permanence (See studies described earlier as well as Corrigan, 1977, 1978).

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CONVERSATION HOUR: MENTAL REPRESENTATION AND EARLY LANGUAGE DEVELOPMENT: DIRECTIONS FOR EXPLORING RELATIONSHIPS

RELATIONSHIPS BETWEEN EARLY LANGUAGE AND OTHER SYMBOLIC SKILLS IN YOUNG DOWN'S SYNDROME CHILDREN

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Patricia Munday Hill

I am currently analyzing data generated by an investigation of pretend play and cognitive development in young Down's syndrome children. A forthcoming paper will integrate these results and define further their relationship to developmental theory. The central issue being addressed in this conversation hour is whether there are specifiable relationships across cognitive symbolic domains. Data generated by this research provide information about interrelationships between measures of mental age (MA), object permanence, symbolic play, gesture language and expressive language.

Mental Age and Object Permanence

All subjects whose MA was 15 months or older, except one, had attained stage 6 object permanence. Children's whose mental age was less than 15 months demonstrated greater variability in the range of object permamemce stages (at MA 12 months one child was at stage 4 and one at stage 5; at MA 14 months one child was at stage 4, two at stage 5, and three at stage 6).

Mental Age and Symbolic Play Level

The higher mean MA was associated with higher levels of symbolic play. Level 1, pre-symbolic schemes, had a mean MA of 13.4; Level 2-3, single pretend acts, had a mean MA of 17.3; Level 4, pretend combinations, had a mean MA of 20.05; and Level 5, planned symbolic games, had a mean MA of 23 months.

Expressive Language and Object Permanence

All children who had an expressive vocabulary of at least 2 words were at stage 5 object permanence. All children who used sentences of 2 words were at stage 6 object permanence.

Expressive Language and Symbolic Play Level

Four children at Level 1 in symbolic play had no expressive language, whereas, of the 25 children demonstrating higher levels of play, only one had no expressive vocabulary. In addition, the ability to use two word sentences was demonstrated only by children at or above Level 4 in symbolic play.

Gesture Language and Object Permanence

Nine of the thirty children were observed to use gesture as a tool for communication. Of these 9 children, only one child below stage 6 object permanence used gesture (16%) whereas of the 16 children at or above stage 6 object permanence 8 children (50%) used gesture to communicate.

Gesture Language and Sumbolic Play Level

Symbolic play level 4, pretend combinations, again appears to mark a transitional point in the use of gesture as it did with expressive language. Only one of the 12 children (8%) demonstrating symbolic play below Level 4 used gestures for communication. In contrast, 8 of the 16 children (50%) at or above Level 4 in symbolic play were using gesture.

These preliminary analyses suggest further exploration of the relationship between Language and other symbolic abilities in young Down's syndrome children.

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Conversation Hour Leonard

Communicative and Sensorimotor Development in Down's Syndrome Children

Carol Greenwald and Laurence B. Leonard

The use of imperative and declarative performative behaviors was examined in nonretarded and Down's syndrome children operating at two stages of sensorimotor intelligence. Children operating at the fifth sensorimotor stage generally showed more advanced performative behaviors than the children operating at stage four. Relative to comparative groups of nonretarded children, the Down's children seemed to rely more heavily on gestures and appeared less consistent in making use of the communicative abilities they possessed.

In order to determine whether chronological age, independent of sensorimotor stage, could serve as an important factor in Down's syndrome children's communicative behavior, comparisons were made between the original stage five Down's subjects' performative behaviors and those of a group of stage five Down's children who were significantly older. A difference favoring the older Down's group was seen for both imperative and declarative performatives. In fact, a number of the older Down's children showed linguistic skills (specifically, referential speech) seemingly in advance of their cognitive abilities. Such a finding raises at least two possibilities, as yet untested. It is possible that the older children had simply exceeded the age level at which particular linguistic and cognitive abilities are related. Alternatively, the relationship between linguistic and cognitive ability may weaken the longer Down's syndrome children remain at a particular stage of cognitive development. Resolution of this issue should not only provide useful information concerning the sensorimotor parallels of communicative development in Down's children in particular, but should offer an important test of the relationship between sensorimotor and communicative development in children in general.

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SENSORIMOTOR DEVELOPMENT AND PRE-LINGUISTIC COMMUNICATION

Steckol, K.F., and Leonard, L.B.

Several months prior to a child's first words, he displays an intention to communicate. The behavioral form which these early communication attempts take has prompted an exploration of whether such attempts might be integrally tied to the child's sensorimotor intelligence (Harding and Golinkoff, 1977; Snyder, 1976; Sugarman, 1973). Particularly notable in this regard has been the work of Bates and her colleagues (Bates et al., 1975; Bates et al., 1977). They identified two sets of behaviors that served as communication intentions, or "performatives," prior to the use of words. The first, termed "proto-declarative," represented a child's preverbal effort to direct the adult's attention to some event or object in the environment. The second, termed "proto-imperative," represented a child's preverbal effort to get an adult to perform some act for the child. The use of these performatives seemed closely tied to the child's moving into stage five of sensorimotor intelligence.

Thus far, all of the available evidence suggesting the relationship between sensorimotor abilities and performatives have been correlational in nature. The present study was designed to investigate the relationship between performance on cognitive tasks and pre-linguistic performative development using an experimental design that controlled for sensorimotor acquisition and general maturational factors.

Thirty-two children were assigned to four conditions devoted to facilitating particular sensorimotor schemes, with an eye toward any subsequent changes in their use of pre-linguistic performatives. Group one was trained on means-end schemes, group two was trained on schemes for relating to objects, group three was trained on means-ends schemes and schemes for relating to objects, and group four was used as a control group, receiving no training. Prior to training implementation, none of the 32 children were demonstrating proto-declarative or proto-imperative performative behaviors and all of the children were performing at stage four sensorimotor development or below.

Results indicated that 1) schemes for relating to objects' behaviors were successfully trained and that means-end training was unsuccessful; 2) the pattern observed for usage of the proto-declarative directly mirrored the findings of schemes for relating to objects training; 3) no significant differences were observed among the subject groups in terms of their usage of the proto-imperative. The results suggest then, that the developmental level of children's schemes for relating to objects is capable of being facilitated. Along with this facilitation, there is definite increase in proto-declarative development. Means-end behaviors could not be experimentally facilitated given the methodology used in this investigation. The children trained on means-end schemes failed to show an increase in the use of performatives. If a relationship did exist between the two, a lack of development in the use of performatives might be expected given the lack of development in the children's means-end schemes. The causal and homologue models of language development will be discussed in light of these results.

The major contribution of this study is that it provided the strongest evidence offered thus far for a relationship between children's sensorimotor development and performative usage. Specifically, schemes for relating to objects were found to relate to proto-declarative usage. Prior to this study investigators have relied on correlational data as their basis for assuming a relationship between these two abilities. In the present study, experimental treatment of children's schemes for relating to objects was successful, allowing for a more systematic examination of any corresponding changes in the children's use of performatives.

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Panel discussion at meetings of the Society for Research in Child Development, San Francisco, 1979.

Contextual Support: A Perspective on the Development of Language and Action

Following Piaget, changes over time in young children's communicative and other behaviors are generally described in terms of a change from non-symbolic to symbolic modes. However, this "symbolic perspective" can be problematic when it is used to describe changes in children's actions on objects. First, the assumption that young children have in mind that one object "stands for" another object has been questioned by El'Konin (1966) and Huttenlocher and Higgins (1978). El'Konin argued that for the young child actions which are often considered symbolic are directly learned from adults. More recent work has shown that mothers didactically teach young children many behaviors that are assumed to require transformations (e.g. Dunn, 1976). Second, it is in practice often difficult to define symbolic play in a way that clearly distinguishes it from other behaviors (Rocissano, 1979).

An alternative perspective, that of contextual support, is evident in Vygotsky's (1976) discussion of play, as well as in the work of other theorists. Rocissano (1979) identified four levels of contextual support in the object-actions of eight children. The children were observed three times in a laboratory playroom over a six-month period, beginning when MLU was >1.0 but <1.5. Less contextual support was judged available to the child for actions at each succeeding level. The final two levels, Level III (actions which were appropriate to the specific physical characteristics of objects, and which could be discovered through object-exploration) and Level IV (actions which were conventional and in addition required information gained through past observation of another person's action on a similar object), accounted for most of the children's actions at all three observations, but while Level III actions predominated at Observation I, Level IV actions tended to predominate by Observation III.

Changes in the children's utterances which referred to relations also seemed to reflect increasing independence from contextual support. That is, the relational terms used by the children at Observation I tended to be context-bound, in that, in information theory terms, they inherently ruled out few possible referents. For example, relational terms like "more", "gone", etc. may refer to almost any object, as well as to events. Later occurring terms, like "eat" and "put" rule out reference to events and also limit the domain of potential object referents.

The proportion of utterances falling into the category of least contextual support in language and the proportion of actions falling into the category of least contextual support in play was calculated for each child at each Observation. A rank order correlation across the children between these language and play measures was then calculated for each Observation. These correlations increased from $\tau = .22$ ($p > .15$) at Observation I to $\tau = .71$ ($p < .01$) at Observation III.*

This result suggests the existence of a skill(s) common to the higher levels of contextual independence in both language and action. That is, at Observation I, the skill(s) underlying the higher levels of contextually independent behavior may have required a great deal of mental effort because they were not yet well practiced. Given the children's limited mental capacity, there would have been insufficient capacity remaining for those additional operations required to actually perform the contextually independent language and action behaviors (cf. Shatz, 1979). Under these circumstances, the performance of such behaviors would

*Age has been partialled out of the Observation III correlation.

depend on supporting information from the immediate situation, and such supporting information could easily vary across language and action, as well as across children. Such a state of affairs would result in the low language/action correlation at Observation I. However, at Observation III, the skill(s) underlying the higher levels of contextual independence may have been routinized to the point that sufficient mental capacity could be applied to the additional operations necessary for performance without the need for situational support. In such circumstances, when situational variability was no longer a major determinent of performance, the high language/action correlation appeared.

Contextual support as an alternative to the "symbolic perspective" may also prove useful in the cross-cultural study of young children's behavior, in that it provides another way to examine children's play in cultures which discourage pretense, as well as a more broadly defined way to examine certain aspects of semantic development than specific categories of meaning such as "action", "possessive", etc., whose appearance may be to a large extent determined by cultural factors. Finally, contextual support may also prove useful in examining developmental changes in children at developmental risk. such as the blind child, by providing a less restrictive view of behavior than has been usual from the symbolic perspective.

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SRCD Conversation hour on Representation and Language, March 1979

Statement by Kurt W. Fischer

The meaning of representation is unfortunately not clear in the developmental research literature. Piaget does not give a clear definition of representation, and most researchers have simply used an operational definition--one of Piaget's tasks, such as invisible displacements in object permanence. According to my skill theory of cognitive development, the simplest kind of representation involves the coordination of at least two sensory-motor systems into a single skill. That is, the child must be able to carry out the actions in one sensory-motor system while relating them to the actions in a second sensory-motor system.

Based on this definition, my collaborators and I have devised three different measures of representation, involving agent use, classification, and self-recognition. For each of these, we have devised a measure of a developmental sequence, in which the task for a simple representation is merely one step in the sequence.

The measure of agent use involves the child's pretend play. To demonstrate a simple representation, he or she must make a doll or other object act as if it is actively carrying out some specific action, like walking across the floor, eating, or going to sleep (Watson & Fischer 1977). In making the doll thus act as an independent agent, the child coordinates two sensory-motor systems--for example, one for manipulating the doll and one for the actions of eating.

In the measure of classification, children sort blocks according to color or shape. At the level before simple representations, they can sort into single monolithic categories, like red circles. But not until the level of representations can they coordinate two such categories so as to consistently sort blocks into, for example, red circles and yellow circles (Fischer & Roberts in preparation).

For the measure of self-recognition, children respond to tasks involving their own image in a mirror. Before simple representations, they can use much of the information about their own image; but not until the level of representations can they respond appropriately to a question about who is there in the mirror (Bertenthal & Fischer 1978).

The most popular Piagetian measure of representation is the invisible-displacements task in the object-permanence series. According to the skill theory, this task does not require representation; and in accordance with this interpretation, our research indicates that children who solve the task do not mentally recreate the displacements of the object (Bertenthal & Fischer 1979). The task merely seems to form a developmental scale because of its trickiness and complexity. A new task needs to be devised to test representation in a search situation.

General Reference: Fischer, K. W. A theory of cognitive development: The control and construction of hierarchies of skills. Psychological Review, in press.

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